Claim Rejections under §103(a)

The Examiner has rejected all claims pending in the current application under 35 U.S.C. §103(a) as being unpatentable over DiMeo Jr. et al. (5,972,430) in view of Kirlin et al. (5,453,494). In response, Applicants assert that the Examiner has not provided a reference which teaches or suggests ***each and every feature*** of the ALE process, as taught and recited in all the pending claims. Accordingly, Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness.

DiMeo teaches a "digital chemical vapor deposition (CVD) method." '430 Col. 6, ll. 30-40; *See* '430, Claims 1 and 12. This digital CVD method comprises the steps illustrated in Figure 2, namely simultaneously depositing (step 32) via CVD a first and second precursor reactant source material to form a multi component oxide precursor layer and then purging (step 34) the chamber with an inert gas. *See* Col. 9, ll. 21-52. Next, the multi-component oxide precursor layer is oxidized (step 36) and then the chamber is purged (step 38) for the second time. *See* Col. 9, ll. 53-67-Col. 10, ll. 1-14. The resulting oxide layer is measured (step 40) and, if the final thickness is inadequate, then steps 32-40 are repeated. *See* Col. 10, ll. 14-30.

The Examiner characterizes DiMeo as "disclos[ing] a CVD method for forming multi-component oxide layers," as compared with Applicants' recited ALE method. Office Action at p. 2 (*emphasis added*). However, the Examiner argues that "[t]he CVD method is described as an ***equivalent variant*** to the related ALE (atomic layer epitaxy)." *Id.* (*emphasis added*).

In view of DiMeo's digital CVD teachings outlined above, Applicants disagree with the Examiner's characterization of DiMeo as teaching that CVD is an "equivalent variant" to ALE. Chemical vapor deposition (CVD) and atomic layer epitaxy (ALE) are not equivalent variants, but rather are deposition processes which employ different means to achieve different ends. Furthermore, Applicants respectfully submit that the Examiner has pointed to no specific teaching within DiMeo which teaches or suggests that CVD and ALE methods are "equivalent variant[s]" for the purpose of DiMeo's disclosed method. DiMeo only mentions ALE in passing in the Background section of the application, and does not teach the applicability of DiMeo's recited method to ALE anywhere else in the application. Instead, DiMeo states in the Background section that "(CVD) methods and ***related*** epitaxial deposition methods, such as but

not limited to atomic layer epitaxial (ALE) deposition methods, are in turn also presently ***of substantial interest***." '430 Col. 1, ll. 44-50 (*emphasis added*).

Applicants assert that it does not follow from the Examiner's statement above that deposition methods which are ***"related"*** are also ***equivalent*** from the standpoint of applying DiMeo's teachings. In fact, Applicants assert that the teachings of DiMeo, although advantageous for practicing CVD, would be contradictory to the principles of ALE technology.

For example, DiMeo teaches that ***during each cycle*** the multi-component oxide precursor layer "be preferably formed over the substrate 14 to a thickness of from about 5 to about 100 Angstroms employing an appropriate precursor reactant source materials flow rate." '430 Col. 9, ll. 34-38; Fig. 2. The resulting layer would be so thick that ***several molecular layers*** forms on the substrate per cycle. Such disclosure is inapplicable to ALE, of which a major advantage is the precise deposition of only approximately ***one molecular layer*** per cycle. In comparison, DiMeo's CVD is incapable of this level of precision.

DiMeo's CVD method and ALE also differ in terms of the control of layer thickness. For example, the thickness of DiMeo's precursor layer is ***controlled by altering the flow rate*** of the precursor reactant source materials. In contrast, ALE functions in a ***self-controlled fashion*** through saturating the substrate surface with a single reactant at a time (*i.e.*, mutually reactive compounds are ***not*** introduced simultaneously), with no need for metering the flow rate of the reactant in order to control deposition rates. Furthermore, DiMeo's suggested substrate temperature of "about 560 degrees Centigrade" would be so high that the metal source chemicals would decompose on the substrate surface. '430 Col. 11, line 67-Col. 12, line 1. In fact, as DiMeo teaches a CVD method, the decomposition of metal source chemicals is desirable as an inherent property of CVD, but not ALE. As a result, the reference does not teach the self-saturation of the substrate surface, as practiced in an ALE method. *See* '062 Application p.9, ll. 6-8.

Yet another example illustrating that DiMeo does not disclose or suggest a ALE process can be found at column 12, lines 53-57 where it is stated that the "barium strontium titanate (BST) layers were formed upon the first series of substrates employing the foregoing conditions for a total of 100 cycles, which provided barium strontium titanate (BST) layer of total thickness about 3300 Angstroms." It can be deduced from this teaching that the growth rate was 33

Angstroms per cycle, which is far above the range of growth rates possible using ALE, as will be readily appreciated.

In view of the above disclosure, Applicants believe that DiMeo's digital CVD method does not teach or suggest an ALE process, as taught and recited by Applicants. As a result, Applicants assert that the Examiner has failed to support a *prima facie* case of obviousness by not providing references which teach or suggest each and every feature of Applicants' invention.

CONCLUSIONS

In view of the foregoing remarks and amendments, Applicants request reconsideration of the rejections and respectfully submit that the claims are in condition for allowance. If, however, some issue remains that the Examiner feels can be addressed by Examiner's Amendment, the Examiner is cordially invited to call the undersigned for authorization.

Attached hereto is a separate paper entitled **CLEAN SET OF PENDING CLAIMS**, in which added Claims 28-35 additions are included.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: December 13, 2002

By: Adeel Syed Akhtar

Adeel S. Akhtar
Registration No. 41,394
Attorney of Record
2040 Main Street
Fourteenth Floor
Irvine, CA 92614
(415) 954-4114

W:\DOCS\DKJ\DKJ-2070.DOC://cc1
120902